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AUTHOR Davis, George H.
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ABSTRACT

A working paper in the final report of the Arizona Board of Regents' Task Force on Excellence, Efficiency and Competitiveness, this study provides information on the debate about "research versus teaching" in the modern American university and, specifically, in Arizona's three universities. The Arizona universities' alumni survey, conducted by the EEC Task Force Staff, solicited facts on background, education, and employment history and sought opinions on the quality and impact of the college experience. There were great differences between the impressions of Northern Arizona University (NAU) alumni of their undergraduate experience and those of University of Arizona (UA) and Arizona State University (ASU) alumni. NAU undergraduate alumni appreciated small class size and personal attention and thought the effort of the teachers was exceptional. UA undergraduate alumni felt that faculty were extremely uneven and professors should spend more time teaching. ASU alumni said professors do not care about their students. The mission factor is discussed, and issues peculiar to Arizona are noted. Other subjects presented are: scholarship and stewardship of human knowledge; role of the teacher; university instruction; the ideal world; research versus teaching; the best that research universities have to offer to undergraduate students; the value of research-oriented faculty; the value of graduate students; and the value of modern equipment. Since good research and good teaching go hand in hand, undergraduate students must have rich experiences in the classroom and labs. This means each faculty member, department, college, and university must define the optimum balance between teaching and research. (SM)

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# HOW SHOULD UNIVERSITIES RESPOND TO THE IMPERATIVE, "PROFESSORS SHOULD SPEND MORE TIME TEACHING AND LESS TIME ON RESEARCH!"

GEORGE H. DAVIS

U.S. DEPARTMENT OF EDUCATION
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## ALUMNI ATTITUDES REGARDING THEIR UNDERGRADUATE EXPERIENCE

The Arizona universities' alumni survey, conducted by the EEC Task Force Staff, was an American College Testing Program questionnaire that solicited facts on background, education and employment history. Furthermore, it gathered opinions on the quality and impact of the college experience. Following the battery of standardized questions, respondents were given the opportunity to provide general written comments. Some of the volunteered comments bear directly on impressions of overall instruction, as opposed to instruction received in one's academic major. Even a quick reading of these written comments reveals quite a contrast between NAU alumni impressions of their undergraduate experience versus UA and ASU alumni impressions of their undergraduate experience. The differences provide a useful starting point in addressing the national issue, the great debate, on "research versus teaching" in the modern American university.

Northern Arizona University undergraduate alumni "appreciated small class size and personal attention;" value the fact that they had "full professors for class and not teaching assistants"; "thought that the effort of the teachers was exceptional"; felt that "the small size of classes and the availability of faculty was very important"; and reported that "teachers were a constant source of support, information, and guidance." Positive assessments were occasionally interrupted by disparaging comments such as, "I felt that the quality of teaching was very poor in the liberal arts courses. I really resented being spoon-fed the materials in the courses and prior to exams."

University of Arizona undergraduate alumni who chose to provide written comment felt that "faculty were extremely uneven"; believe that "professors should spend more time teaching"; observed that "fundamental subjects were often taught by foreign teaching assistants

George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona, in other parts of the country and the world. He also served as Head of the Department of Geosciences and serves as Vice Provost for Academic Affairs at UA.

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who spoke little or no English"; "never felt that the faculty were interested in their welfare"; and urged that one should "always leave open the opportunity to get rid of poor instructors." Disparaging assessments were occasionally interrupted by positive comments such as "majority of professors were excellent and inspiring."

Arizona State University undergraduate alumni who chose to volunteer written opinion felt that "professors do not care about their students"; "science teaching assistants did not speak good English"; "quality of faculty is uneven"; and urged "don't take classes from graduate students," "remove professors who can't convey material," and find "Dr. Deadwood and replace with Dr. Educator, leaving Dr. Research in the laboratory where he is happy." Disparaging assessments were occasionally interrupted by positive comments such as "I enjoyed very much my academic experience at ASU. Nearly all the teachers were excellent."

## THE MISSION FACTOR

These comments and general observations are probably not truly representative of the overall opinions of all alumni for each of the three universities. The self-selection at work in the volunteering of written comments results in strong opinions, but not necessarily representative opinions. But we take this input seriously as a starting point in this discussion because it so effectively captures public perceptions of what is good about teaching-oriented colleges and universities, and what is bad about research-oriented universities.

The alumni attitudes invite questions like: "Why can't the undergraduate classroom experience at Arizona State University and University of Arizona be more like the undergraduate experience at Northern Arizona University?" "Why do the University of Arizona faculty have to spend so much time on research?" "Why do the classes at Arizona State University have to be so large?" "Why are so many courses at research universities taught by teaching assistants?"

University mission is the major factor. Whereas the mission for Northern Arizona University is fundamentally directed toward undergraduate education, the missions for the University of Arizona and Arizona State University have substantial research dimensions. The University of Arizona is charged by the state to be among the most competitive PhD-granting institutions in the nation. Arizona State University is charged by the state to develop as a competitive research university.

For a university to fulfill the dual mission of teaching and research, each faculty member is given a dual assignment: to teach and to carry out substantive research. Most Arizona State University and University of Arizona faculty teach fewer courses per semester than most Northern Arizona faculty. Almost all faculty at the University of Arizona and Arizona State University teach undergraduate courses and graduate courses, whereas most Northern Arizona University faculty teach mainly undergraduate courses.

The extra requirement of research prevents most faculty at the University of Arizona and Arizona State University from being as available to undergraduate students as they would be if their assignment was strictly one of instruction. Add to this the raw numbers of students that characterize large, public

research-oriented universities; add to undergraduate instructional requirements a large order of graduate/professional instructional responsibilities; add the cohort of graduate students who depend on experience as laboratory assistants, discussion leaders, or instructors as a primary part of their professional education; add the fact that, nationwide, most graduate students in engineering and mathematics are foreign nationals whose first language is not English; and we see with full force the vulnerability of universities with significant research missions to undergraduate criticism: too much research, not enough teaching, and too much teaching by graduate students.

## THE ISSUES ARE LARGER THAN ARIZONA

The national measuring stick for assessing the quality and stature of comprehensive universities is calibrated in first-order units of research scholarship, as defined by research expenditures and strength of PhD programs, and undergraduate student quality, as defined by SAT or ACT scores, high school class ranks, and high school grade point averages. Public universities whose admissions requirements are not particularly selective concede the possibility of establishing nationally recognized stature on the basis of the quality of their undergraduate student body. Instead, research productivity becomes the avenue for attracting national and international attention, and for exerting national and international intellectual influence.

Given this perspective, it naturally follows that decisions on promotion and tenure for individual faculty members are heavily influenced by quality of research scholarship, number(s) of books and journal articles, and number, size, and significance of grants and contracts. Outstanding undergraduates, who look ahead to graduate and professional studies, pay attention to the national stature of the universities they consider. Those universities and states that attract the best graduate and professional students are the richer for it.

Institutions of higher learning like the University of Arizona and Arizona State University, charged by their home state through the Board of Regents to assume a viable, competitive position nationally, must hire faculty that have the potential of teaching effectively while at the same time developing a national, if not international, reputation for creative scholarship. Faculty recruitment thus is carried out with foremost attention to identifying and hiring individuals who have clearly established a record of outstanding scholarship, or who show promise to do so. This is not to say that effectiveness as a teacher does not merit close and careful consideration, for it does. However, the best universities have learned that it is possible to hire excellent scholars who are at the same time outstanding teachers, and it is this goal that drives most recruitment searches for new faculty.

## THE FEDERAL CONNECTION

The emphasis on research scholarship as a measure of university stature and as a fundamental component of promotion, tenure, and salary adjustment partly reflects the synergistic relationship that has evolved over the years among universities, the Federal Governement, State Government, and the private sector. It is revealing to learn how crucial it is for professors who are

scientists or engineers to win support from agencies like the National Science Foundation or the National Institutes of Health. Seldom are scientists at research-active institutions promoted and tenured without having established that the Federal Government has seen fit, following peer review, to support the work of the faculty member under consideration. This fact illustrates the degree to which the Federal Government harnesses university professors as vehicles to carry out fundamental basic and applied research, not just as a service to society, but as a critical dimension of America's ability to maintain a competitive position in the world. This is probably not obvious to undergraduate students, nor should it be.

## SCHOLARSHIP, AND STEWARDSHIP OF HUMAN KNOWLEDGE

When students enter the environment of a university, we want them to fall under the influence of active researchers and creative scholars and artists. Universities are niches in society where human knowledge gained over time is guarded and preserved, and where the quest for and the discovery of new knowledge is pursued. Faculty attempt to prepare and motivate students to master it, and to develop a sense of value for it.

Stewardship of human knowledge requires more than storing and cataloging. It requires pouring through what exists while constantly appraising and reappraising its content and value. Such appraisal is most effectively driven by active research, scholarship, and creative expression. There is no agency external to faculty that prescribes what of the limitless bounds of human knowledge should be presented in the few lecture hours of a given semester. Some sense of what must be shared is derived in part from values and priorities acquired through graduate and professional school experience, i.e., on experiences which, over time, recede further and further into the background of one's career. The main insight regarding what must be shared is derived from what has become valued during the course of personal scholarly and/or artistic activities, and that of colleagues. These activities result in a testing and checking of what is important to the individual scholar, and to colleagues within an academic discipline. If a gulf widens between what is presented (i.e., passed on) and what is known to be valued, then the professor's capacity to motivate students to value and to master what in fact is presented may be diminished.

## ROLE OF THE TEACHER

Commonly the term "teacher" is used in too limited a way, with emphasis on classroom contact with students, out-of-class contact with students, including advising, but with little emphasis on preparation for contact with students. When "preparation" is viewed broadly and generously, it becomes obvious that research, scholarship, and creative expression contribute to it. Within a research university, part of the preparation for teaching chemistry is functioning as a research chemist; part of the preparation for teaching art is discovering new knowledge through creative expression; part of the preparation for teaching humanities is to explore ancient civilizations through patient, protracted excavation of the right sites.

Students in all fields, whether engineering, journalism, or business,

commonly feel that they are in good hands if they know that they are being taught by someone who knows the real world. Why? Because the ongoing practical activities of engineering or journalism or business in the real world help to sort out what is to be mastered and what is to be valued. Students have the sense that these "real world people" know what to present. The real world for faculty in a research university is the arena of research and scholarship -- the arena in which they function not as teachers, but as artists and engineers, lawyers and sociologists, i.e., as masters of their professional field.

Professors in colleges and universities whose mission emphasis is teaching of undergraduate students are required to stay up to date in their field of study by keeping up with the literature, attending professional meetings, engaging in some scholarship, and taking full advantage of sabbatical leaves to catch up on the literature and to function as scholars uninterrupted by heavy teaching demands. Such faculty are not generally expected or required to make fresh, original contributions, although some often do. Increasingly, however, colleges and universities that traditionally have emphasized undergraduate teaching are raising the research/scholarship expectations they hold for their faculty. Part of this initiative is the faculty themselves, expressing how vital research and scholarship are to their professional work as teachers.

Faculty in research-oriented universities are expected to deal with human knowledge at the margins...where recently acquired knowledge is used to test old assumptions, and where fast-breaking new knowledge is being integrated with what already is known to exist. Active scholarship is absolutely essential to this process.

## UNIVERSITY INSTRUCTION

Within research universities, courses like entry-level English, mathematics, and foreign languages that are most like high school courses can and, for financial reasons, must be taught by instructors who do not have research requirements as a part of their job responsibilities. Emphasis in such instruction should be on clarity of presentation, thoughtful organization and choice of topics, availability outside of the classroom, and an obvious personal interest in students and teaching. Our undergraduates should expect to receive no less than this.

The non-basic skills courses in a research university must be taught by actively engaged scholars and artists or adjunct faculty who simultaneously are discovering new knowledge, preserving it, and transferring it to students in ways that will make lives more meaningful and productive. Emphasis in instruction should include clarity and organization, exceptional judgment in selection of relevant topics that are right up to date, significant substance, and unsurpassed mastery of concepts.

There comes a point where the research emphasis becomes so dominant that it obstructs the possibility of responsible, responsive instruction. How do we know when the point is reached, or exceeded? What are the signs?: Too many absences at professional meetings; unavailability outside of the classroom; unpreparedness for lecture; the lack of extra effort that is revealed in old tired examples instead of new lively contemporary illustrations; overspecialized content in comparison to what the course has advertised; very

small teaching load semester after semester; and certain attitudinal characteristics, some none too subtle, such as direct statements in class saying "I don't really like to teach."

Universities should respond to the imperative, "Professors should spend more time teaching and less time on research," by recognizing that **time is not the issue**. Rather, it is the quality of time, the quality of instruction, that is delivered to the undergraduates that is at issue. Research-oriented universities have the human resources to provide exceptional instruction to undergraduates and they need to do so more consistently and more evenly.

## THE IDEAL WORLD

Our undergraduate students in research universities should ideally bask in a world where scholarship...avid, thirsty scholarship, is clearly and conspicuously visible to them, so they are moved by the substance and by the passion for learning and inquiry that is so clearly modeled by the professor. We want our students to be around people who bring the subject area alive because they are players.

Timothy S. Healy, President of Georgetown University, cited John Henry Newman's remark: "we can get information from books, but real learning must come from exposure to "those in whom it lives." President Healy goes on to say: "When a student sees that the professor is the live embodiment of a discipline, when he understands in class or lab the excitement as well as the stress of discovery, when in his later and graduate years he actually shares in problems that lie on the edge of knowledge, all this can turn his learning upside down, make it live and breathe. The world of ideas is very human indeed, so the familiar slides easily into rote, the already known quickly turns to boredom. But let waft across the enterprise even a whiff of a real frontier and attention stiffens and excitement grows."

Mastery of content, depth of creative insight, and passion for the subject,--if these characteristics are sufficiently powerful, large class sizes and relative unavailability outside of the classroom will not weigh too heavily in the overall experience.

## RESEARCH VS TEACHING

A factor that works against the universities as they try to interpret and explain the role of research is the way in which the expectations and requirements of mission, and promotion and tenure, are described. University narratives on promotion and tenure, for example, tend to split teaching and research into separate categories, as if these activities cleanly can be divorced, one from another. This approach tends to disguise the fact that research provides insights that enhance the substance of what is taught and how passionately it is taught. This approach tends to discount the fact that new ideas for research spring from class presentations and discussion, that new ideas spring from the dynamics of the classroom.

Perhaps it would be better to rewrite promotion and tenure expectations in a way in which professors are viewed as scholars and creative artists at work on several fronts that are internally coherent. Universities might wish to emphasize more strongly that they intend to promote the development of a community of scholars that creates an environment that will enrich the

educational experience of students and colleagues, that will promote original contributions in human knowledge and in artistic expression, and that will result in enrichment of society as a whole.

The expectation for each scholar is to continuously strive to master the branch (or branches) of knowlege relevant to his/her discipline, to develop and communicate nationally and internationally new knowledge through original work, and to systematically and clearly pass on the best of what is known in ways that will motivate students to both master and value this new knowledge.

## WHAT IS THE BEST THAT RESEARCH UNIVERSITIES HAVE TO OFFER TO UNDERGRADUATE STUDENTS?

Public universities, in general, have not been successful in convincing society that excellence in research and excellence in teaching, including undergraduate teaching, go hand in hand. The more that universities, faculties, and boards are able to demonstrate that this is the case, especially to our students and to the outside constituencies of parents, alumni, and legislators, the more the universities will be valued.

Research universities offer three resources which undergraduate colleges and universities whose fundamental mission is teaching do not: (1) a large number of research-oriented faculty members who are actively contributing to the advancement of the discipline with which they are associated and by which they are motivated; (2) the presence of graduate students, who serve as role models for lighting the path of early-career professional development beyond the undergraduate experience; and (3) modern, sophisticated laboratory equipment and instrumentaton won through hard-earned federal grant money and competitive petitioning for state support. Each of these resources affects the undergraduate major. The more these resources are brought into close contact with our undergraduates, the richer the experience of the undergraduate student and the wiser the decision to pursue undergraduate education at a quality, large-enrollment, research-oriented public university.

## VALUE OF RESEARCH-ORIENTED FACULTY

Research universities such as the University of Arizona and Arizona State University need to do a better job of marketing what it means to be a faculty member at a major research university. What must a scholar or artist be prepared to do to stay at the forefront of his/her field?: 1/ Compete successfully for public or private money on the basis of provocative ideas, workable strategies, and evidence of proven professional accomplishment and/or compelling professional promise; 2/ Push one's skills and expertise to the limit in making an original discovery, an original interpretation, an original creative expression; 3/ Maintain close contacts with colleagues nationally and internationally, communicating ideas and interpretations through performances, presentations at meetings, and publishing of articles at frequent intervals in recognized peer-review journals; and 4/ Recruiting and supporting outstanding graduate and professional students, involving them in the scholarship and preparing them for their respective career paths. These activities alone may require a 30-/ or 40-hour week, without

mentioning the academic responsibilities of teaching undergraduate and graduate courses and advising undergraduate and graduate students. Research demands can be astonishing, and the requirements for professional accomplishment and recognition in the creative arts equally astonishing.

Professors, in the ideal world, are up-to-date contributors in their fields and, collectively, they are able to see in advance, and even help determine, where their discipline is heading. The values and goals which faculty members possess, combined with faculty perceptions of their discipline and its direction, profoundly influence mattters of teaching and advising, the planning of curriculum, the designing of individual courses, and the evaluation of the promise of students.

Universities should more effectively explain to those outside of the institutions that faculty members at large research universities find themselves continuously shifting and adjusting their teaching and research loads, searching for an effective balance which if found is all too quickly lost. If they shift their activities and energies too far away from the students they are to serve, the students find themselves inadequately served. On the other hand, if faculty members shift their activities and energies "too far" studentward, they may find themselves slipping behind in the research productivity they expect for themselves and which others expect of them. In short, it is not straightforward to balance both the challenges required for scholarshsip with the significant responsibilities of teaching and advising.

Too often faculty members are seen by undergraduate students simply as conveyors of knowledge, as contrasted with discoverers of new knowledge. This is not so much the fault of the students as it is of the faculty and the institution. When faculty members permit their identity as scholars to be exhibited in lecture or lab, e.g., by demonstratively drawing upon their wealth of experience, the resource called "research oriented faculty" begins to have a dramatic impact on the undergraduate experience. It can illuminate what scholarship is all about. It can lead to the setting of higher goals. It can help disclose the true nature of the academic field that the undergraduate is about to enter. To be sure, when faculty members share their scholarly dimensions, interests, and habits with their students, important messages are conveyed that are invaluable.

## VALUE OF GRADUATE STUDENTS

The resource called "graduate students" is simply not part of the experience of undergraduate students at colleges and universities whose mission is mainly teaching. It is well known that graduate students, as teaching assistants, contribute significantly and often very positively to undergraduate education at large-enrollment public universities. Yet, they are often the objects of criticism. Foreign national students, for example, who emerge from intense competition in their respective homelands to carry out graduate work in the United States, are especially vulnerable to criticism in the classroom, because English may not be their first language. Depending on circumstances, graduate-student teaching assistants may be viewed by undergraduates as welcome providers of undivided personal attention and down-to-earth explanation, or as obstructions which prevent undergraduates from coming to know their professors.

We often hear undergraduates praise graduate students as among the best instructors they have had. But the immeasureable value of graduate students in undergraduate education does not rest necessarily with the specific teaching functions they perform. Rather their primary value may be in the role-modeling that graduate students, perhaps unknowingly, provide to those junior and senior majors who are fortunate enough to see that graduate students are emerging professionals and scholars involved in an exciting phase of their career development.

Seeing graduate students in action can be a revelation to undergraduate majors. For example, the undergraduate learns through the number, diversity, and depth of M.S., M.A., and PhD research projects that there is much new ground yet to be explored in the search for new knowledge. Undergraduates who penetrate graduate-student office complexes are privy to discussions and arguments that attack the "truths" which comprise the fundamental body of knowledge of undergraduate education. The undergraduate soon learns that some truths can be upheld while others must be modified or abandoned altogether. In close contact with graduate students, undergraduates learn that in order to grow as professionals they too must begin to question more rigorously, to begin to identify an area of concentration that suits them, to select and gain entrance to an appropriate professional or graduate school, or to explore more knowledgeably for a job in the private sector. Those that are inclined toward further education learn that they must begin to select and gain entrance to an appropriate graduate school, to somehow find an advisor, to define a research problem or creative activity, to launch into high-energy commitment to the program and project, and to eventually transform the experience into a defendable thesis or dissertation. There is great urgency to do all of this, for the alert undergraduate recognizes very quickly that graduate students only one or two years older than they have somehow managed to insert themselves into the all-encompassing graduate experience: "How did they do it?" "How will I do it?"

Early discovery of the life and scholarship of graduate students can result in tremendous academic growth. The influence of graduate students can provide a greater seriousness as well as a greater pleasure to the undergraduate experience. In short, undergraduates who encounter the phenomenon called "graduate education" have the chance to make career decisions earlier and in a more informed fashion. Those students who decide to pursue careers in scholarship are more likely to make a smoother transition into graduate school and the research functions that surround it. Ultimately, the insight derived should quicken the pace and smooth the road to greater academic maturity.

## THE VALUE OF MODERN EQUIPMENT

Students quickly see through the canned laboratory experiments centered about out-of-date, worn equipment. In contrast, they are likely to respond more enthusiastically when entrusted to "real" data gathering and experimentation using modern equipment in actively functioning laboratories. Although some departments still reserve such equipment for use by graduate students and faculty, other departments have learned that undergraduates, given the opportunity, respond as if they were being paid the highest compliment, in a way that

delivers the sensation that a 15-year-old feels upon dismounting from the mini-tractor lawnmower and slipping into the driver's seat of the family car. Although both for learning and safety the first trips are supervised experiences, they are nonetheless unforgettable.

The opportunity to gain experience in modern laboratories at large universities, or to harness a state-of-the art computer, or to perform on a brand new musical instrument, enhances the education of the undergraduate not because of the gleam of the equipment, but because of what the equipment represents and because of the activities it generates. This equipment, in turn, is available because of the research emphasis of the university, and success in the severe competition for research funding.

## CONCLUSIONS

Arguing that good research and good teaching go hand in hand is not a matter of marketing. It is a matter of demonstrating that this is the case to our own undergraduate students...by giving them rich experiences in the classroom and the labs. This requires each faculty member, each department, each college, and each university to define the optimum balance between teaching and research, with the "optimum level" expressed in a balanced equation between serving students and serving the research and service mission requirements of the individual institution. The more that undergraduates are brought into close contact with the energy of scholarship, research, and performance as embodied in the interests, activities, and enthusiasm of its faculty and graduate students, the better the quality of the learning experience, and the greater the chances that the universities can erode the dogma that good research and bad teaching go together. In short, we will over time have more advocates to affirm that outstanding research and outstanding teaching do go hand in hand.